APHIS Factsheet

Veterinary Services

February 2007

Questions and Answers About Brucellosis

Q. What is brucellosis?
A. It is a contagious, costly disease of animals that also affects humans. Although brucellosis can infect other animals, its main threat is to cattle, bison, and swine. The disease is also known as contagious abortion or Bang's disease. In humans, it's known as undulant fever because of the severe intermittent fever accompanying human infection or Malta fever because it was first recognized as a human disease on the island of Malta.

Q. How serious is brucellosis?
A. Considering the damage done by the infection in animals—decreased milk production, weight loss in animals, loss of young, infertility, and lameness—it is a very serious disease of livestock. The rapidity with which it spreads and the fact that it is transmissible to humans makes it all the more serious.

Q. What disease agents cause brucellosis?
A. The disease is caused by a group of bacteria known scientifically as the genus *Brucella*. Three species of *Brucella* cause the most concern: *B. abortus*, principally affecting cattle, bison, and cervids; *B. suis*, principally affecting swine and reindeer but also cattle and bison; and *B. melitensis*, principally affecting goats, but which is not present in the United States. In free-roaming bison and elk in the Greater Yellowstone area, the bacterium of concern is *B. abortus*. In cattle and bison, the disease primarily localizes in the reproductive organs and/or the udder. Bacteria are shed in milk or via the aborted fetus, afterbirth, or other reproductive tract discharges.

Q. What are the signs of brucellosis?
A. There is no effective way to detect infected animals by their appearance. The most obvious signs in pregnant animals are abortion or birth of weak calves. Milk production may be reduced from changes in the normal lactation period caused by abortions and delayed conceptions. Not all infected cows abort, but those that do usually abort between the fifth and seventh month of pregnancy. Infected cows usually abort once, but a percentage will abort during additional pregnancies, and calves born from later pregnancies may be weak and unhealthy. Even though their calves may appear healthy, infected cows continue to harbor and discharge infectious organisms and should be regarded as potentially serious sources of the disease. Other signs of brucellosis include an apparent lowering of fertility with poor conception rates, retained afterbirths with resulting uterine infections, and (occasionally) enlarged, arthritic joints.

Q. How is brucellosis spread?
A. Brucellosis is commonly transmitted to susceptible animals by direct contact with infected animals or through an environment that has been contaminated with discharges from infected animals. Aborted fetuses, placental membranes or fluids, and other vaginal discharges present after an infected animal has aborted or calved are all highly contaminated with infectious *Brucella* organisms. Cows may lick those materials or the genital area of other cows or ingest food or water contaminated with the disease-causing organisms. Despite occasional exceptions, the general rule is that brucellosis is carried from one herd to another by an infected or exposed animal. This mode of transmission occurs when a herd owner buys replacement cattle or bison that are infected or have been exposed to infection prior to purchase. The disease may also be spread when wild animals or animals from an affected herd mingle with brucellosis-free herds.

Q. What is being done to fight brucellosis?
A. Before 1934, control of brucellosis was limited mainly to individual herds. Today, there is a Cooperative State–Federal Brucellosis Eradication Program to eliminate the disease from the country. Like other animal disease eradication efforts, success of the program depends on the support and participation of livestock producers. The program's Uniform Methods and Rules set forth the minimum standards for States to achieve eradication. States are designated brucellosis free when none of their cattle or bison are found to be infected for 12 consecutive months under an active surveillance program. For current brucellosis State classifications, see the updates posted at <www.aphis.usda.gov>.

Q. What about free-ranging bison herds?
A. The presence of brucellosis in free-ranging bison and elk in Yellowstone National Park and Grand Teton National Park threatens the brucellosis status of the

surrounding States and the health of their livestock herds, which are free of the disease. Wyoming lost free status in 2004 and Idaho in 2005 due to co-mingling of free-roaming elk with local cattle herds. Wyoming regained its free status in September of 2006. Reintroduction of the disease into a brucellosis-free State could have a serious economic impact on domestic livestock markets and potentially threaten export markets. The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) is working cooperatively with other State and Federal agencies to eliminate brucellosis from the infected free-roaming bison and elk populations in the Greater Yellowstone area.

Q. How do epidemiologists help fight brucellosis?

A. Epidemiologists are specially trained investigators who study the occurrence of disease in populations of animals in order to determine how the disease is spread and how best to control and eradicate the disease. Epidemiologists are concerned with disease in a group or population of animals and evaluate circumstances connected with the occurrence of disease. These veterinarians help eliminate brucellosis by identifying factors essential to its control, eradication, and prevention.

Q. How costly is brucellosis to the livestock industry?

A. The livestock and dairy industries and the American consumer have realized great financial savings from the success of the Cooperative State–Federal Brucellosis Eradication Program. Annual losses from lowered milk production, aborted calves and pigs, and reduced breeding efficiency have decreased from more than $400 million in 1952 to less than $1 million today. Studies have shown that, if brucellosis eradication program efforts were stopped, the costs of producing beef and milk would increase by an estimated $80 million annually in less than 10 years.

Q. How effective is the Brucellosis Eradication Program?

A. At the beginning of the program, brucellosis was widespread throughout U.S. livestock, but eradication efforts have had dramatic results. In 1956, 124,000 affected herds were found by testing in the United States. By 1992, this number had dropped to 700 herds, and as of October 31, 2006, no known affected herds remained in the entire United States. A total of two affected herds were found and depopulated in fiscal year 2005. APHIS anticipates the Cooperative State–Federal Program to achieve the goal of nationwide eradication of brucellosis from domestic cattle and bison within the next year.

Q. What is the basic approach to eradication?

A. Historically, the basic approach has always been to vaccinate calves, test cattle for infection, and send infected animals to slaughter. Identification of market animals for tracing, surveillance to find infected animals, investigation of affected herds, and vaccination of replacement calves in high-risk areas are important features of the current program.

Q. How is infection found in cattle?

A. Two primary surveillance procedures are used to locate infection without having to test each animal in every herd. Milk from dairy herds is checked two to four times a year by testing a small sample obtained from creameries or farm milk tanks for evidence of brucellosis. Bison herds and cattle herds that do not produce milk for sale are routinely tested for brucellosis by blood-testing animals sold from these herds at livestock markets or at slaughter. In addition, some States require adult cattle and bison to be subjected to blood tests for brucellosis upon change of ownership even if sold directly from one farm to another. If brucellosis is detected, remaining animals from the herd of origin are tested.

Q. What happens when evidence of disease is found by surveillance testing?

A. Once an infected herd is located, the infection is contained by quarantining all infected and exposed cattle and bison and limiting their movement to slaughter only, until the disease can be eliminated from the herd. Depopulation of brucellosis affected herds is recommended. Diagnostic tests are used to find all infected cattle and bison. Federal and State animal health officials test neighboring herds and other herds that may have received animals from the infected herd. In addition, officials test the source herds for any animals sold into the infected herd. In addition, officials test the source herds for any animals sold into the infected herd. All possible leads to additional infection are traced.

Q. How does the brucellosis milk surveillance test (BMST) work?

A. The BMST procedure (also known as the brucellosis ring test (BRT)) makes it possible to do surveillance on dairy herds quickly and economically. Milk or cream from each milking cow in the herd is pooled, and a sample is taken for testing. A suspension of stained, killed *Brucella* organisms is added to a small quantity of milk. If the milk from one or more infected animals is present in the sample, a bluish ring forms at the cream line as the cream rises.

Q. How does market cattle identification (MCI) work?

A. Numbered tags, called backtags, are placed on the shoulders of adult breeding animals being marketed from beef, dairy, and bison herds. Blood samples are collected from the animals at livestock markets or slaughtering plants and tested for brucellosis. If a sample reacts to a diagnostic test, it is traced by the backtag number to the herd of origin. The herd owner is contacted by a State or Federal animal health official to arrange for testing of his or her herd. Once the animals have been gathered, all of the eligible animals in the herd are tested at no cost to the owner.

Q. Which animals are eligible for MCI testing?
A. At slaughter, all cattle and bison 2 years of age or older are tested, except steers and spayed heifers. At market, all beef cattle and bison over 24 months of age and all dairy cattle over 20 months of age are tested except steers and spayed heifers. Pregnant or postparturient heifers are also eligible for testing regardless of their age. Herd tests must include all cattle and bison over 6 months of age except steers and spayed heifers.

Q. Why is identification of market cattle important?
A. The key to the MCI program is proper identification of all animals so they can be traced to their herds of origin. Most livestock markets identify cattle and bison with numbered USDA-approved backtags. Backtags, as well as eartags and other identification devices, are collected and sent to the diagnostic laboratory along with the matching blood samples to aid in identifying ownership of test-positive animals.

Q. What are the advantages of MCI?
A. MCI provides a means of determining the brucellosis status of animals marketed from a large area and eliminates the need to round up cattle and bison in all herds for routine testing. MCI, along with other preliminary testing procedures, is effective in locating infection so control measures can be taken to contain the disease and eliminate it.

Q. Does the brucellosis market cattle identification program satisfy the identification component of the National Animal Identification System (NAIS)?
A. No. A program for a single, specific disease such as brucellosis would not satisfy the identification component of NAIS. The goal of NAIS is to provide an infrastructure that will help producers and animal health officials respond more quickly and effectively to any significant animal disease event in the United States. Since NAIS is designed to support all animal disease programs, we cannot rely on disease-specific programs alone to achieve the goals of a national identification program. For example, the brucellosis market cattle identification program is limited to adult breeding animals being marketed from beef, dairy, and bison herds. If we were to rely on this program for national animal identification purposes, it would represent only a fraction of animals in the United States that are susceptible or vulnerable to any number of diseases of concern.

Q. What is the brucellosis card test?
A. It is a rapid, sensitive, and reliable procedure for diagnosing brucellosis infection. It employs disposable materials contained in compact kits. *Brucella* antigen is added to the blood serum on a white card. Results of the test are read 4 minutes after the blood serum and antigen are mixed.

Q. Are there any other tests for brucellosis?
A. There are a number of supplemental tests based on various characteristics of antibodies found in the blood and milk of infected animals. These tests are especially useful in identifying infected animals in problem herds and herds in which chronic brucellosis infection exists and from which infection is difficult to eliminate. Another diagnostic method involves culturing *Brucella* organisms from infected tissues, milk, or other body fluids, from aborted calves or fetal fluids and membranes.

Q. What animals are eligible for testing?
A. With certain exceptions, herd tests must include all cattle and bison over 6 months of age except steers and spayed heifers.

Q. What is the incubation period of brucellosis?
A. An incubation period is the interval of time between exposure to an infectious dose of organism and the first appearance of disease signs. The incubation period of brucellosis in cattle, bison, and other animals is quite variable, ranging from about 2 weeks to 1 year and even longer in certain instances. When abortion is the first sign observed, the minimum incubation period is about 30 days. Some animals abort before developing a positive reaction to the diagnostic test. Other infected animals may never abort. Generally, infected animals that do not abort develop a positive reaction to the diagnostic test within 30 to 60 days after infection, although some may not develop a positive reaction for several months to over a year.

Q. Can brucellosis in animals be cured?
A. No. Repeated attempts to develop a cure for brucellosis in animals have failed. Occasionally, animals may recover after a period of time. More commonly, however, only the clinical signs disappear and the animals remain diseased. Such animals are dangerous sources of infection for other animals with which they associate.

Q. Can brucellosis be prevented?
A. The disease may be avoided through good sanitation and management practices, as well as vaccination. Replacement animals should be tested when purchased and retested after a 30- to 60-day isolation period, during which they are kept separate from the remainder of the herd. These practices will allow detection of animals that were in the incubation period of the disease when acquired.

Q. What about vaccination?
A. For cattle and bison in infected areas or for replacement animals added to such herds, officials recommend vaccinating heifers with an approved *Brucella* vaccine. *Brucella* Strain RB51 is the vaccine used in the United States. The vaccine is a live product and must be administered only by an accredited veterinarian or State or Federal animal health official. For best results, female calves should be vaccinated when they are 4 to 6 months old. At the time of vaccination, a tattoo is applied in the ear, which identifies the animal as an "official vaccinate." The tattoo identifies the type of vaccine used and the year in which vaccination took place.

Q. How does the vaccine work?
A. *B. abortus* vaccine produces an immune response that increases the animal's resistance to the disease. However, vaccination is not 100 percent effective in preventing brucellosis; it typically protects about 70–80 percent of the vaccinated cattle from becoming infected by an average exposure to *Brucella*.

Q. Previously, Strain 19 was the only approved *Brucella* vaccine. What is the difference between Strain 19 and RB51?
A. In March 2003, USDA granted full licensure for the *Brucella* vaccine called Strain RB51, for use in cattle. Strain RB51 is as efficacious as Strain 19 vaccine but virtually eliminates adverse postvaccination reactions in cattle, such as abortions and localized inflammation at the vaccine injection site. Most importantly, unlike Strain 19, Strain RB51 does not stimulate the same type of antibodies that can be confused on standard diagnostic tests with those antibodies produced by actual infection.

Q. Is Strain RB51 vaccine approved for use in bison?
A. *B. abortus* Strain RB51 has been approved for use in bison in an official USDA program.

Q. Where or when is vaccination in calves most important?
A. Owners whose herds are located in areas of relatively heavy infection or who ship replacement cattle or bison to, or receive animals from, such areas should carry out a vigorous calfhood vaccination program. Every cattle or bison owner, regardless of location, should discuss the advantages and disadvantages of vaccination with his or her veterinarian. In addition, owners should be sure to check with individual States regarding the age and vaccination requirements for import of cattle and bison for breeding purposes.

Q. Where is vaccination less important?
A. In many areas of the country where infected herds have not been found for several years and where the detection of early infection through BMST (also known as BRT), MCI, and other surveillance systems is in effect, the need to continue calfhood vaccination is not recommended. Vaccination should be reduced in such areas, provided that adequate regulatory measures are in effect to prevent reintroduction of the disease.

Q. How does brucellosis affect humans?
A. People infected with the brucellosis organism usually develop symptoms similar to a severe influenza, but this disease, called undulant fever, persists for several weeks or months and may get progressively worse. Farmers, ranchers, veterinarians, and packing plant workers are more vulnerable to becoming infected because they come into direct contact with infected animals. The initial symptoms are fatigue and headaches, followed by high fever, chills, drenching sweats, joint pains, backache, and loss of weight and appetite. Undulant fever does not often kill its victims, but the disease is too serious to be dealt with lightly. For additional information on brucellosis in humans, visit the Centers for Disease Control and Prevention Web site at <www.cdc.gov>.

Q. What are the main sources of human infection?
A. In years past, prior to pasteurization, raw milk from infected cattle was considered the prime source of brucellosis in humans. Today, most humans contract the disease by coming into direct contact with aborted fetuses, afterbirth, and uterine discharges of diseased animals or with infected carcasses at slaughter. However, one 1994 study suggests that human brucellosis in California is most likely to be a foodborne illness (unpasteurized milk or cheese products) acquired in Mexico or from Mexican products consumed in California. Rarely, if ever, does a human contract the disease from another human.

Q. How common is human brucellosis in this country?
A. Fortunately, the combination of pasteurization of milk and progress in the eradication of the disease in livestock has resulted in substantially fewer human cases than in the past. Ninety-eight cases of human brucellosis were reported in 1997, a fraction of the 6,400 cases reported in 1947. Currently, about 80–100

cases of human brucellosis are reported annually. Many of those are people who have traveled internationally and ingested unpasteurized dairy products.

Q. Can people get brucellosis by eating meat?
A. There is no danger from eating properly cooked meat products because the disease-causing bacteria are not normally found in muscle tissue and they are killed by proper cooking temperatures. The disease may be transmitted to humans when slaughtering infected animals or when processing contaminated organs from freshly killed animals.

Q. How can people be protected from brucellosis?
A. Ranchers, farmers, or animal managers should clean and disinfect calving areas and other places likely to become contaminated with infective material. All individuals should wear sturdy rubber or plastic gloves when assisting calving or aborting animals, and scrub well with soap and water afterward. Precautions against drinking raw milk or eating unpasteurized milk products are also important. Ultimately, the best prevention is to eliminate brucellosis from all animals in the area.

Q. Where can I find more information on brucellosis?
A. For additional information, contact:
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National Center for Animal Health Programs
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Riverdale, MD 20737-1231
Phone: (301) 734-6954 or visit our Web site at <http://www.aphis.usda.gov/vs/>.
